

**REMARKS**

New claims 50-53 are added. No new matter is added as the new claims are supported at, for example, page 14 and Fig. 7 of the originally-filed application. Claims 38-53 are pending in the application.

The title is objected to as not being descriptive (pg. 2 of paper 7). The title is amended to be descriptive, and therefore, Applicant respectfully requests withdrawal of the objection in the next Office Action.

Claims 38-49 stand rejected under 35 U.S.C. §103 as being unpatentable over Soleimani et al. (U.S. Patent No. 5,596,218) in view of Gardner et al. (U.S. Patent No. 6,225,151). Claims 38-49 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over U.S. Patent No. 6,417,546.

Regarding the rejection under the judicially created doctrine of obviousness-type double patenting, Applicant presents a terminal disclaimer herewith to overcome such rejection. Accordingly, Applicant respectfully requests withdrawal of this rejection in the next Office Action.

Regarding the rejection against claim 38 based on the combination of Soleimani and Gardner, such claim recites a gate dielectric layer of n-type field effect transistors being different in composition from a gate dielectric layer of p-type field effect transistors. The Examiner relies on Soleimani to teach all the limitations recited in claim 38 except for this last stated limitation. Soleimani teaches providing nitrogen atoms in the gate oxides 52a and 52b, respectively, in PMOS and NMOS transistors of a CMOS device 50 (col. 4, Ins. 36-45; Fig. 6) for the specific purpose of controlling the "hot carrier" effect which becomes more problematic as the semiconductor industry continues to reduce the size of the

respective transistors (col. 1, Ins. 33-65). Gardner teaches that the drive current of n-channel IGFETs may be negatively affected by significant concentration of nitrogen in and near the channel (col. 11, Ins. 64-67), and therefore, for speed dominated circuits, circuit performance may be enhanced by limiting the nitrogen implant to the p-channel IGFETs (col. 12, Ins. 1-2). The Examiner relies on this teaching of Gardner to state it would be obvious to modify the Soleimani invention to not include nitrogen atoms in the gate dielectric of n-channel transistors to avoid any detrimental effects (pg. 3 of paper no. 7). The Examiner continues, by not including the nitrogen atoms, the limitation recited in claim 38, that is, a gate dielectric layer of n-type field effect transistors being different in composition from a gate dielectric layer of p-type field effect transistors is taught by the combination of Soleimani and Gardner (pg. 3 of paper no. 7). However, modifying the Soleimani invention as proposed by the Examiner would render the Soleimani invention unsatisfactory for its intended purpose contrary to case law and the MPEP.

The Examiner is respectfully reminded that if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. MPEP §2143.01 (8th Edition) *citing to In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Soleimani teaches providing nitrogen atoms in **both** gate oxides 52a and 52b, respectively, of both PMOS and NMOS transistors of a CMOS device 50 (col. 4, Ins. 36-45; Fig. 6). *Silicon Processing*, by S. Wolf, (pgs. 348-363, vol. 2, *Process Integration*; pgs submitted herewith in a supplemental I.D.S.) clearly establishes that the "hot carrier" effect is problematic for NMOS and PMOS transistors of a MOSFET device. Consequently, to modify the Soleimani invention as suggested by the Examiner from the teachings of Gardner, that is,

to remove the nitrogen from the n-channel transistors of the Soleimani invention would render the Soleimani invention unsatisfactory for its intended purpose. That is, to protect both the NMOS and PMOS transistors from the “hot carrier” effect. Pursuant to the above authority, such modification of the Soleimani invention is improper, and therefore, the obviousness rejection based on the combination is improper and must be withdrawn. For at least reason, claim 38 is allowable.

Moreover, the Examiner is respectfully reminded that if the proposed modification or combination of the prior art would change the principal of operation in the prior art invention being modified, then the teachings of the reference are not sufficient to render the claims *prima facie* obvious. MPEP §2143.01 (8th Edition) *citing to In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). The court in *In re Ratti* reversed a rejection holding the “suggested combination of references would require substantial reconstruction and redesign of elements shown in the [primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate” 270 F.2d at 813, 123 USPQ at 352. Modifying the Soleimani invention by removing the nitrogen atoms from the n-channel transistor of the CMOS device would clearly require substantial reconstruction and redesign of the Soleimani invention contrary to the above authority. Moreover, modifying the Soleimani invention would change the basic principle in which the Soleimani construction was designed to operate, that is, to overcome the hot carrier effect **in the NMOS** and PMOS transistors. Therefore, the combination of art is inappropriate for this obviousness rejection against claim 38, and for this additional reason, claim 38 is allowable. Since the Examiner has not provided a proper combination of art

to reject claim 38, such claim is allowable. Applicant respectfully requests allowance of claim 38 in the next Office Action.

Claims 39-42 depend from independent claim 38, and therefore, are allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are not taught or shown by the art of record.

Regarding the rejection against claim 43 based on the combination of Soleimani and Gardner, such claim recites p-type field effect transistors comprising silicon dioxide having nitrogen atoms therein and n-type field effect transistor comprising silicon dioxide material proximate an interface of the gate dielectric layer with the semiconductor substrate which is substantially void of nitrogen atoms. The Examiner relies on the same rationale for combining Soleimani and Gardner as was presented for rejecting independent claim 38 to allegedly teach such limitation of claim 43. Consequently, for the reasons discussed above with respect to independent claim 38, such combination of art is inappropriate for an obviousness rejection against claim 43 and should be withdrawn. For all the reasons discussed above for the allowance of independent claim 38, claim 43 is allowable for the same reasoning. Applicant respectfully requests allowance of claim 43 in the next Office Action.

Claim 44 depends from independent claim 43, and therefore, is allowable for the reasons discussed above with respect to the independent claim, as well as for its own recited features which are not shown or taught by the art of record.

Regarding the obviousness rejection against claim 45 based on the combination of Soleimani and Gardner, such claim recites a gate dielectric layer of n-type field effect transistors are different in composition from a gate dielectric layer of p-type field effect

transistors. The Examiner relies on the same rationale for combining Soleimani and Gardner as was presented for rejecting independent claim 38 to allegedly teach such limitation of claim 45. Consequently, for the reasons discussed above with respect to independent claim 38, such combination of art is inappropriate for an obviousness rejection against claim 45 and should be withdrawn. For all the reasons discussed above for the allowance of independent claim 38, claim 45 is allowable for the same reasoning. Applicant respectfully requests allowance of claim 45 in the next Office Action.

Claim 46 depends from independent claim 45, and therefore, is allowable for the reasons discussed above with respect to the independent claim, as well as for its own recited features which are not taught or shown by the art of record.


Regarding the obviousness rejection against claim 47 based on the combination of Soleimani and Gardner, such claim recites a gate dielectric layer of p-type field effect transistors comprising silicon dioxide having nitrogen atoms therein and a gate dielectric layer of n-type field effect transistor comprising silicon dioxide material being substantially void of nitrogen atoms. The Examiner relies on the same rationale for combining Soleimani and Gardner as was presented for rejecting independent claim 38 to allegedly teach such limitation of claim 47. Consequently, for the reasons discussed above with respect to independent claim 38, such combination of art is inappropriate for an obviousness rejection against claim 47 and should be withdrawn. For all the reasons discussed above for the allowance of independent claim 38, claim 47 is allowable for the same reasoning. Applicant respectfully requests allowance of claim 47 in the next Office Action.

Claims 48-49 depend from independent claim 47, and therefore, are allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are not taught or shown by the art of record.

This application is now believed to be in immediate condition for allowance, and action to that end is respectfully requested. If the Examiner's next anticipated action is to be anything other than a Notice of Allowance, the undersigned respectfully requests a telephone interview prior to issuance of any such subsequent action.

Respectfully submitted,

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Appl. N . 10/087,416

Application Serial No . . . . . 10/087,416  
Filing Date . . . . . February 27, 2002  
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Group Art Unit . . . . . 2811  
Examiner . . . . . Douglas W. Owens  
Attorney's Docket No . . . . . MI22-1965  
Title: Integrated Circuitry (As Amended)

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING  
RESPONSE TO JULY 25, 2002 OFFICE ACTION

**In the Specification**

The replacement specification paragraphs incorporate the following amendments.

Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

The title is amended as follows: Integrated Circuitry ~~and Semiconductor Processing~~  
~~Method of Forming Field Effect Transistors~~

**In the Claims**

The claims have been amended as follows. Underlines indicate insertions and  
~~strikeouts~~ indicate deletions.

No amendments to the claims.

New claims are added as follows:

50. (New) The integrated circuitry of claim 38 wherein the semiconductor substrate forms an interface with the respective n-type and p-type field effect transistors, and wherein the semiconductor substrate at the interface is substantially void of nitrogen atoms.

51. (New) The integrated circuitry of claim 43 wherein the semiconductor substrate at the interface is substantially void of nitrogen atoms.

52. (New) The integrated circuitry of claim 45 wherein the semiconductor substrate forms an interface with the respective n-type and p-type field effect transistors, and wherein the semiconductor substrate at the interface is substantially void of nitrogen atoms.

53. (New) The integrated circuitry of claim 47 wherein the semiconductor substrate at the interface is substantially void of nitrogen atoms.

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